# PATENT COOPERATION TREATY



From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To:

NIHEI, Masayuki
Tomin Shinjuku Bldg 2F
8-8, Shinjuku 2-chome
Shinjuku-ku, Tokyo 160-0022
JAPON

# PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Rule 71.1)

| | |
|---|---|
| Date of mailing *(day/month/year)* | 27.09.2004 |
| Applicant's or agent's file reference<br>P62-0303 | **IMPORTANT NOTIFICATION** |

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/JP 03/08143 | 26.06.2003 | 26.06.2002 |

Applicant
MATSUSHITA REFRIGERATION COMPANY

1. The applicant is hereby notified that this International Preliminary Examining Authority transmits herewith the international preliminary examination report and its annexes, if any, established on the international application.

2. A copy of the report and its annexes, if any, is being transmitted to the International Bureau for communication to all the elected Offices.

3. Where required by any of the elected Offices, the International Bureau will prepare an English translation of the report (but not of any annexes) and will transmit such translation to those Offices.

4. **REMINDER**

The applicant must enter the national phase before each elected Office by performing certain acts (filing translations and paying national fees) within 30 months from the priority date (or later in some Offices) (Article 39(1)) (see also the reminder sent by the International Bureau with Form PCT/IB/301).

Where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary examination report. It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned.

For further details on the applicable time limits and requirements of the elected Offices, see Volume II of the PCT Applicant's Guide.

The applicant's attention is drawn to Article 33(5), which provides that the criteria of novelty, inventive step and industrial applicability described in Article 33(2) to (4) merely serve the purposes of international preliminary examination and that "any Contracting State may apply additional or different criteria for the purposes of deciding whether, in that State, the claimed inventions is patentable or not" (see also Article 27(5)). Such additional criteria may relate, for example, to exemptions from patentability, requirements for enabling disclosure, clarity and support for the claims.

| Name and mailing address of the international preliminary examining authority: | Authorized Officer |
|---|---|
| European Patent Office - P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040 Tx: 31 651 epo nl<br>Fax: +31 70 340 - 3016 | Ter Haar, H<br>Tel. +31 70 340-3817 |

# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| Applicant's or agent's file reference | FOR FURTHER ACTION | See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) |
|---|---|---|
| P62-0303 | | |

| International application No. | International filing date *(day/month/year)* | Priority date *(day/month/year)* |
|---|---|---|
| PCT/JP 03/08143 | 26.06.2003 | 26.06.2002 |

International Patent Classification (IPC) or both national classification and IPC

F04B39/02

Applicant

MATSUSHITA REFRIGERATION COMPANY

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 23.01.2004 | 27.09.2004 |

Name and mailing address of the international preliminary examining authority:

European Patent Office - P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk - Pays Bas
Tel. +31 70 340 - 2040 Tx: 31 651 epo nl
Fax: +31 70 340 - 3016

Authorized Officer

Ingelbrecht, P

Telephone No. +31 70 340-2256

# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/JP 03/08143

## I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

**Description, Pages**

| | |
|---|---|
| 1-43 | as originally filed |

**Claims, Numbers**

| | |
|---|---|
| 6-8 | as originally filed |
| 5 | received on 09.04.2004 with letter of 07.04.2004 |
| 1-4, 9-17 | received on 30.07.2004 with letter of 28.07.2004 |

**Claims, Pages**

| | |
|---|---|
| 46 | as originally filed |
| 45a | received on 09.04.2004 with letter of 07.04.2004 |
| 44, 45, 47, 47a, 48, 48a, 48b | received on 30.07.2004 with letter of 28.07.2004 |

**Drawings, Sheets**

| | |
|---|---|
| 1/10-10/10 | as originally filed |

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☒ the claims, Nos.: 12
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   *(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Yes: | Claims | 1-11,13-17 |
| | No: | Claims | |
| Inventive step (IS) | Yes: | Claims | 1-11,13-15 |
| | No: | Claims | 16,17 |
| Industrial applicability (IA) | Yes: | Claims | 1-11,13-17 |
| | No: | Claims | |

2. Citations and explanations

**see separate sheet**

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Reference is made to the following documents:

   D1: US-A-4 576 555 (ASCHENFELTER ROGER N.) 18 March 1986 (1986-03-18)
   D2: US-A-2 583 583 (MANGAN JOHN R) 29 January 1952 (1952-01-29)
   D3: US-A-5 118 263 (FRITCHMAN JACK F) 2 June 1992 (1992-06-02)
   D4: DE 17 97 261 U (LICENTIA PATENT-VERWALTUNGS-GMBH) 8 October 1959 (1959-10-08)

2. The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and discloses a hermetic compressor having a sealed housing storing therein lubricating oil and receiving therein a motor element and a compression element driven by said motor element, said compression element comprising a shaft having an eccentric shaft portion, and an auxiliary shaft portion and a main shaft portion coaxially provided on upper and lower sides of said eccentric shaft portion so as to sandwich it there between, a cylinder block provided with a compression chamber of a substantially cylindrical shape, a main bearing fixed to or formed integral with said cylinder block so as to be substantially perpendicular to an axis of said compression chamber and supporting an upper half portion of said main shaft portion of said shaft, an auxiliary bearing fixed to or formed integral with said cylinder block and supporting said auxiliary shaft portion, a piston that performs reciprocating motion in said compression chamber, and connecting means for coupling said piston and said eccentric shaft together, wherein said shaft is provided with an oil feed mechanism having a lower end communicating with said lubricating oil and an upper end penetratingly open to an upper end portion of said auxiliary shaft portion.

3. The subject-matter of claim 1 differs from this known hermetic compressor in that said auxiliary shaft portion is provided with an oil fence for receiving the lubricating oil spouting out from the upper end portion of said oil feed mechanism and an oil feed passage for conducting the lubricating oil to a sliding surface of said piston.

3.1 The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

3.2 The problem to be solved by the present invention may therefore be regarded as an insufficient lubrication of the auxiliary bearing.

3.3 The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

3.4 Although documents D3 and D4 disclose fences on the cylinder block to catch lubricating oil to guide it to the cylinder for lubrication of the piston, it is not disclosed nor rendered obvious to use a fence to retain some of the oil for lubrication of the auxiliary bearing.

3.5 Claims 2-11 and 13-15 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

4. The subject-matter of claim 16 differs from this known hermetic compressor in that on either the auxiliary bearing or on the cylinder block, an oil fence is provided for receiving the lubricating oil spouting out from the upper end portion of the oil feed mechanism, and guiding it to the oil feed mechanism.

4.1 The subject-matter of claim 16 is therefore new (Article 33(2) PCT).

4.2 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claim 16 does not involve an inventive step in the sense of Article 33(3) PCT. The reasons therefore are the following.

4.3 The feature of providing an oil fence on the cylinder block for receiving the lubricating oil spouting out from the upper end portion of the oil feed mechanism, and guiding it to the oil feed mechanism is described both in document D3 and in document D4 as providing the same advantages as in the present application. The skilled person would therefore regard it as a normal design option to include this feature in the hermetic compressor described in document D1.

4.4 Dependent claim 17 does not contain any features which, in combination with the features of claim 16 to which it refers, meet the requirements of the PCT in respect of inventive step.

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CLAIMS

1. (Twice Amended) A hermetic compressor having a sealed housing storing therein lubricating oil and receiving therein a motor element and a compression element driven by said motor element, said compression element comprising a shaft having an eccentric shaft portion, and an auxiliary shaft portion and a main shaft portion coaxially provided on upper and lower sides of said eccentric shaft portion so as to sandwich it therebetween, a cylinder block provided with a compression chamber of a substantially cylindrical shape, a main bearing fixed to or formed integral with said cylinder block so as to be substantially perpendicular to an axis of said compression chamber and supporting an upper half portion of said main shaft portion of said shaft, an auxiliary bearing fixed to or formed integral with said cylinder block and supporting said auxiliary shaft portion, a piston that performs reciprocating motion in said compression chamber, and connecting means for coupling said piston and said eccentric shaft together, wherein said shaft is provided with an oil feed mechanism having a lower end communicating with said lubricating oil and an upper end penetratingly open to an upper

end portion of said auxiliary shaft portion, and said auxiliary bearing is provided with an oil fence for receiving the lubricating oil spouting out from the upper end portion of said oil feed mechanism and an oil feed passage for conducting the lubricating oil to a sliding surface of said piston.

2. A hermetic compressor according to claim 1, wherein an oil pool for storing said lubricating oil is concavely formed in said oil feed passage on an upper surface of said auxiliary bearing.

3. A hermetic compressor according to claim 1, wherein an oil dispersion hole communicating with said oil feed mechanism is formed in a substantially horizontal direction at a portion of said auxiliary shaft portion above an upper surface of said auxiliary bearing.

4. A hermetic compressor according to claim 1, wherein said oil fence is made to project upward and is provided on an upper surface of said auxiliary bearing in the vicinity of said oil feed passage.

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5. A hermetic compressor according to claim 1, wherein an opening portion is provided, said

passage.

9. A hermetic compressor according to claim 1, wherein a substantially annular oil feed groove communicating with said oil feed passage in the vicinity of a bottom dead center of said piston is concavely formed on an outer periphery of said piston.

10. A hermetic compressor according to claim 1, wherein an oil bath communicating with sliding surfaces between said auxiliary shaft portion and said auxiliary bearing is formed around said auxiliary shaft portion.

11. A hermetic compressor according to claim 10, wherein an oil feed hole is formed on said auxiliary shaft portion, said oil feed hole establishing communication between said oil bath and said oil feed mechanism and having a bottom surface located above a bottom surface of said oil bath.

12. (canceled)

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13. A hermetic compressor according to claim 1, wherein an oil fence projecting upward is provided on a surface of said cylinder block above the compression chamber, and said oil feed passage is formed in the surface of said cylinder block above said compression chamber.

14. A hermetic compressor according to claim 1, which is inverter-driven at a plurality of operating frequencies including at least an operating frequency lower than a power supply frequency.

15. A hermetic compressor according to claim 14, wherein said operating frequency lower than said power supply frequency includes at least an operating frequency lower than 30Hz.

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16.(New) A hermetic compressor having a sealed housing storing therein lubricating oil and receiving therein a motor element and a compression element driven by said motor element, said compression element comprising a shaft having an eccentric shaft portion, and an auxiliary shaft portion and a main shaft portion coaxially provided on upper and lower sides of said eccentric shaft portion so as to sandwich it therebetween, a cylinder block provided with a compression chamber of a substantially cylindrical shape, a main bearing fixed to or formed integral with said cylinder block so as to be substantially perpendicular to an axis of said compression chamber and supporting an upper half portion of said main shaft portion of said shaft, an auxiliary bearing fixed to or formed integral with said cylinder block and supporting said auxiliary shaft portion, a piston that performs reciprocating motion in said compression chamber, and connecting means for coupling said piston and said eccentric shaft together, wherein said shaft is provided with an oil feed mechanism having a lower end communicating with said lubricating oil and an upper end penetratingly open to an upper end portion of said auxiliary shaft portion, and

said cylinder block is provided with an oil fence for receiving the lubricating oil spouting out from the upper end portion of said oil feed mechanism and an oil feed passage for conducting the lubricating oil to a sliding surface of said piston.

17. (New) A hermetic compressor according to claim 16, wherein an oil dispersion hole communicating with said oil feed mechanism is formed in a substantially horizontal direction at a portion of said auxiliary shaft portion above an upper surface of said auxiliary bearing.